POLS 1600: Political Research Methods

Spring 2019

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1 Course Overview

This course offers an introduction to quantitative data analysis for political scientists. The main goal of the course is to provide students with the fundamental statistical and programming skills necessary to consume and produce current social science research. Students will learn how to formulate and test hypotheses using multivariate regression techniques and how to communicate statistical results with confidence and clarity.

Students will also be introduced to R, an open source statistical language. R is the *de facto* standard language for quantitative analysis and is widely used by academics and firms like Google, Facebook and Amazon to gain insights from data. R has about 14,000 packages that extend its core functionalities and it is free to download, use or modify. Compared to Excel or SPSS, R has a slightly steeper learning curve, but its power and flexibility greatly overweight the costs.

2 Course Information

We will meet every Monday, Wednesday and Friday at 13:00 in the CIT Centre (Thomas Watson CTI) 227. Classes will be 50-minutes long. Students are requested to read the materials and run the code before each class. Students should also bring their laptops to the sessions.

All information about the course – including this syllabus, lecture slides, problem sets and assignments – will be available at http://pols1600.github.io. The syllabus will be updated periodically

throughout the course according to the progress of the class. Please remember to visit the website regularly.

I am very flexible when it comes to office hours, but it is easier to contact me via email. Feel free to send me a message any time at danilo_freire@brown.edu, I will probably reply in a few hours. You can also meet me in the afternoon at my office. I am in the Political Theory Project every weekday. My address is 8 Fones Alley, first floor, office 114. If possible, please send me an email before coming to my office just to make sure two students will not book the same time slot.

3 Community Standards

Brown University is committed to full inclusion of all students. Please inform me early in the term if you have a disability or other conditions that might require accommodations or modification of any of these course procedures. You may speak with me after class or during office hours. For more information, please contact Student and Employee Accessibility Services at 401-863-9588 or SEAS@brown.edu. Students in need of short-term academic advice or support can contact one of the deans in the Dean of the College office.

4 Academic Integrity

Many of the assignments of this course consist in writing R code. The best way to learn how to code is to write code, make mistakes, then try again. I kindly ask you not to copy code from other students as I take plagiarism very seriously. I am happy to provide any help you may require with your lessons as long as you are committed to the course. It is also important to cite other people's work whenever necessary, and if in doubt, mention your sources.

5 English Language Learners

Brown University welcomes students from around the country and the world, and the unique perspectives international and multilingual students bring enrich the campus community. To empower multilingual learners, an array of support is available including language and culture workshops and individual appointments. For more information about English Language Learning support at

Brown, contact the ELL Specialists at ellwriting@brown.edu. No student will be penalised for their command of the English language.

6 Requirements and Grading

The means of evaluation includes three components:

- **Participation: 10%**. Students should be active participants in the course. Feel free to ask any question you may have, help others if you know how, and make suggestions or comments you believe are interesting. I hope we create a friendly, open environment for learning and students are the most important part of it.
- **Problem Sets: 40%**. I will assign several programming assignments during the course and they will count towards your grade. We will be using the `swirl` package and other data sets I will distribute over the coming weeks. In the first sessions I will describe how to install the package and how to submit the assignments. Students are encouraged to work in groups but should submit their own code. All problems sets have to be written in RMarkdown.
- **Final Project: 50%**. In the final project, students will have the opportunity to work with real data and conduct their own statistical analyses. I will distribute a series of datasets about important topics in the social sciences and students will use the knowledge they acquire in the course to test new hypotheses on such data. If you would like to work on a particular topic, please let me know and we can try to accommodate your requests. Students can work in groups of up to three people as most academic research is currenty done collaboratively. In the last two weeks of the course, students will present their findings to the class and receive feedback from their colleagues.

7 Course Materials

The primary textbook for the course will be:

> Imai, Kosuke. *Quantitative Social Science: An Introduction.* Princeton, NJ: Princeton University Press, 2018.

The book can be found on Amazon or any other book store. It is not particularly expensive (eBook: US$ 29; Paperback: US$39 on Amazon), and it is important you buy it as soon as possible. The other book we will use in this course is:

> Angrist, Joshua and Pischke, Jörn-Steffen. *Mastering 'Metrics: The Path from Cause to Effect*. Princeton, NJ: Princeton University Press, 2014.

Angrist and Pischke's book is a great introduction to the five most widely-used causal methods in econometrics and political science. It is written in a very accessible style and has many interesting examples. We will use several chapters of the book throughout the course. Ebook version: US$ 19,99; paperback edition: US$31.

For students who need a refresher on introductory calculus and probability, I suggest the following two books:

> Moore, Will and Siegel, David. *A Mathematics Course for Political and Social Research*. Princeton, NJ: Princeton University Press, 2013.

> Chiang, Alpha. *Fundamental Methods of Mathematical Economics*. New York City, NY: McGraw-Hill, Inc. Any edition.

Both books cover all topics we will use in the course and more. Another good source for basic mathematics is Khan Academy.

Students who want to know more about causality and statistical methods are encouraged to read these books:

> Morgan, Stephen and Winship, Christopher. *Counterfactuals and Causal Inference: Methods and Principles for Social Research*. Cambridge: Cambridge University Press, 2016.

> Gerber, Alan and Greene, Donald. *Field Experiments: Design, Analysis, and Interpretation*. New York City, NY: W. W. Norton and Company, 2012.

> Rosenbaum, Paul. *Observation and Experiment: An Introduction to Causal Inference*. Cambridge, MA: Harvard University Press, 2019.

8 Software

As I have mentioned above, we will use R in this course. You can download it at http://www.r-project.org. I strongly recommend you also download `RStudio`, a user interface for R. It is available at http://www.rstudio.com/. Both are free to download and there are versions for Mac, PC and Linux.

R can be challenging for beginners, but fortunately it has a large and helpful software community. You will probably find on the internet the solution for any problem you may have. Two websites are of particular interest: https://stackoverflow.com and https://r4ds.had.co.nz. They are surely going to be very helpful.

9 Course Schedule

The following schedule is preliminary and may change in the next weeks.

Week 1

- **23 January 2019 – Wednesday**: Introduction and course overview. Lecture slides.
- **25 January – Friday:** Introduction to R and RStudio. Please read QSS chapter 1, pages 1-30 and bring your laptop to class. Lecture slides.

Week 2

- **28 January – Monday:** More introduction to R. Lecture slides.
- **30 January – Wednesday:** QSS chapter 2.1-2.4, MM chapter 1. Lecture slides.
- **1 February – Friday**: In class exercise on causality. Homework: Swirl, CAUSALITY 1. In-class exercise.

Week 3

- **4 February – Monday:** Continue exercise on RCTs
- **6 February – Wednesday:** Observational studies. Please read QSS chapter 2.5-2.6. Assignment due: QSS exercise 1.5.1 . Lecture slides.

- **8 February – Friday:** Observational studies continued. Lecture slides.

Week 4

- **11 February – Monday:** Observational studies continued. QSS chapter 2.5-2.6. Lecture slides.
- **13 February – Wednesday:** Introduction to measurement. QSS 3.1-3.4. Lecture slides.
- **15 February – Friday:** In class exercise on measurement. Homework: swirl exercise MEASUREMENT 1. Lecture slides.

Week 5

- **20 February – Wednesday**: Discussion about final project. Lecture slides.
- **22 February – Friday**: Bivariate relationships. QSS 3.5-3.7. Lecture slides.

Week 6

- **25 February – Monday:** More bivariate relationships. Homework: swirl exercise MEASUREMENT 2. Lecture slides.
- **27 February – Wednesday:** More bivariate relationships. In class exercise. Lecture slides.
- **1 March – Friday:** Introduction to prediction. QSS 4.1. Lecture slides.

Week 7

- **4 March – Monday:** Prediction. QSS 4.2. Lecture slides.
- **6 March – Wednesday:** Linear regression. QSS 4.2. Homework: swirl PREDICTION 1. Lecture slides.
- **8 March – Friday:** Linear regression continued. QSS 4.3. Homework: swirl PREDICTION 2. Lecture slides.

Week 8

- **11 March – Monday:** Multivariate regression. Lecture slides.

- **13 March – Wednesday:** Regression review. Homework: swirl PREDICTION 3
- **15 March – Friday:** Regression and causality. QSS 4.3, MM 2 (no need to read the appendix)

Week 9

- **18 March – Monday:** Regression discontinuity designs. Lecture slides.
- **20 March – Wednesday:** In class exercise on regression. Lecture slides.
- **22 March – Friday:** More probability. Homework: swirl PROBABILITY 1. Lecture slides.

Week 10

- **Spring recess**

Week 11

- **1 April – Monday:** Conditional probability. QSS 6.2. Lecture slides
- **3 April – Wednesday:** Bayes' theorem. Lecture slides.
- **5 April – Friday:** In class exercise on probability. Homework: swirl PROBABILITY 1. Lecture slides.

Week 12

- **8 April – Monday:** Probability distributions. QSS 6.3. Assignment 4 due. Lecture slides.
- **10 April – Wednesday:** Large sample theorems. QSS 6.4-6.5. Lecture slides.
- **12 April – Friday:** Discussion about final project. Homework: swirl PROBABILITY 2. Lecture slides.

Week 13

- **15 April – Monday:** Introduction to uncertainty. QSS 7.1.1-7.1.3. Lecture slides.
- **17 April – Wednesday:** Uncertainty. QSS 7.1.4-7.1.6. Homework: swirl UNCERTAINTY 1. Lecture slides.
- **19 April – Friday:** No class.

Week 14

- **22 April – Monday:** Hypothesis testing. Homework: swirl UNCERTAINTY 2. Lecture slides.
- **24 April – Wednesday:** Linear regression. QSS 7.3.1-7.3.4. MM Appendix chapter 2. Lecture slides.
- **26 April – Friday:** Linear regression. QSS 7.3.5-7.4. Lecture slides.

Week 15

- **29 April – Monday:** Review of uncertainty. *Final projects due.* Lecture slides.
- **1 May – Wednesday:** Final project presentations.
- **3 May – Friday:** Final project presentations.